The Delivery of Preventive Services in Primary Care Practices according to Chronic Disease Status

ABSTRACT

Objectives. The current study examined the relationship between chronic disease status and the receipt of cancer preventive services over a 3-year period.

Methods. Adults (n = 4320) cared for by 167 nonacademic physicians in 42 primary care group practices were studied. Medical records were audited for each patient, as were patient responses to two questionnaires assessing health and sociodemographic characteristics.

Results. While the odds of having received counseling to obtain regular checkups were increased for men (1.56) and women (1.46) with hypertension, the odds were reduced (range = 0.32 to 0.81) for having received a sigmoidoscopy (women with diabetes or hypertension, men with hypertension or heart disease), fecal occult blood test (men with diabetes or heart disease, women with heart disease), mammogram or counseling about smoking (women with diabetes), clinical breast exam (women with heart disease), and Pap test (women with diabetes or heart disease).

Conclusions. The presence of common chronic health problems in older adults is associated with lower levels of cancer screening services. (*Am J Public Health.* 1997;87:1190–1196)

Susan A. Fontana, PhD, RN, CS-FNP, Linda C. Baumann, PhD, RN, CS-ANP, Clay Helberg, MS, and Richard R. Love, MD, MS

Introduction

Expanding access and use of clinical preventive services by the year 2000 is a national priority for health promotion and disease prevention.[1] Primary care practices are major sites for providing health promotion and screening services, and integrating these services with routine illness care (e.g., follow-up care for chronic disease) is one strategy to increase the delivery of preventive services. Primary care visit rates tend to increase for middle-aged and older Americans, and thus the potential to augment preventive services is greatest for this population.[2] Our research examined screening services provided by 167 non-academic primary care physicians to 4320 adults 52 to 64 years of age according to patients' self-report of three prevalent chronic health conditions: diabetes, hypertension, and heart disease. This paper (1) describes the relationship between patient-reported chronic disease status and the receipt of cancer prevention and screening services and (2) compares the number and types of health maintenance and non–health maintenance visits according to chronic disease status.

Methods

Background and Setting

This research was part of the Primary Care Prevention Project, a 2 × 2 intervention study designed to facilitate the delivery of optimal cancer and cardiovascular disease prevention and screening services by primary care practice groups to their patients 52 to 64 years of age.[3] Forty-six primary care group practices were recruited from five upper midwestern states. Practices had from 3 to 10 physicians who had worked there at least 3 years, and a majority of these physicians had to agree to participate. Data were collected from questionnaires mailed to 187 participating physicians and their patients and from the patients' medical records. The first three clinics were used to refine the data collection procedure, and one clinic withdrew from the study. In total, our study's pre-intervention data were collected over an 18-month period in 1991/92 from 42 practices with 167 physicians. Written consent was obtained from physicians and their patients according to an approved protocol. Confidentiality of data was assured, and physicians were not told which patients participated.

Sampling Design

Patients were selected to participate from available lists or records. Stratified random sampling produced a representative sample of each physician's caseload and an estimate of prevention activities for the practice overall as compared with those for individual physicians. In addition, proportionate sampling was used to select a two-thirds female and one-third male sample. The larger female sample permitted examination of the cancer screening activities most applicable to this group.

Susan A. Fontana is with the School of Nursing, University of Wisconsin, Milwaukee. Linda C. Baumann is with the School of Nursing, University of Wisconsin, Madison. Clay Helberg is with the Department of Medicine, University of Wisconsin, Madison. Richard R. Love is with the Departments of Medicine and Family Medicine and Practice, University of Wisconsin, Madison.

Requests for reprints should be sent to Susan A. Fontana, PhD, RN, CS, University of Wisconsin, Milwaukee, PO Box 413, Milwaukee, WI 53201.

This paper was accepted October 24, 1996.

Procedures

Potential subjects (12 525) were mailed a 12-item short patient questionnaire to determine eligibility and obtain informed consent. Patients included were 52 to 64 years old at the time of recruitment so that the previous 3-year period referred to in the questionnaire targeted the 50- to 65-year age group. Other inclusion criteria were no history of cancer (except nonmelanomatous skin cancer) and regular patient status. Patients who reported any form of cancer other than nonmelanomatous skin cancer were ineligible. A regular patient was defined as one who had made at least two visits in the previous 5 years, with one visit within the previous 2 years.

Approximately 2 weeks after the short patient questionnaire mailing, nonrespondents received a reminder postcard. Two weeks later, any remaining respondents were then sent a second questionnaire. Five weeks later, consenting participants received a long patient questionnaire that contained 51 items assessing prevention services. The response rate for the short questionnaire was 55% (n = 6889); 94% of this sample denied having cancer, 2% reported skin cancer, and 4% were missing. Eighty-nine percent (n = 6131) completed the subsequent long patient questionnaire. A subsample of patients (n = 5059) was randomly selected for medical record audit of screening services during the previous 3 years. The sample of patients who completed the short and long questionnaires, and who had their medical records audited (n = 4320) was split into two groups: one for estimating the models (n = 2166) and one for validating them (n = 2154). All results and descriptions are based on the estimation sample.

Instruments

The short patient questionnaire contained 12 items designed to (1) verify eligibility for participation, (2) assess the presence of specific chronic health conditions (e.g., diabetes, hypertension, heart disease, and cancer), and (3) document receipt of counseling about smoking, regular checkups, and breast self-exam, as well as receipt of screening services (clinical breast exam, mammography, cervical Pap test, fecal occult blood test, and sigmoidoscopy), over the previous 3 years. Some examples of the items included in these three areas were as follows: (1) "Who is your regular doctor at [name of clinic]?" (2) "Have you ever been told that you have high blood pressure?" and (3) "Over the past three years, has anyone at your clinic . . . given you three cards to take home for you to collect a stool sample (fecal occult blood test) and . . . talked to you about having a regular checkup?"

The long patient questionnaire assessed attitudes and beliefs about specific prevention and screening services, general barriers to screening services, and perceived health status and gathered sociodemographic information. This report incorporates only the data on perceived health status and sociodemographics.

TABLE 1—Mean Number of Clinic Visits (±SD) in a 3-Year Period Made by Regular Patients of Primary Care Group Practices in the Midwest, by Chronic Disease Status and Visit Type

Chronic Disease Status	Visit Type: Health Maintenance	Administrative Physical	Other Prevention	Non–Health Maintenance	Total Visits
Diabetes					
Yes (n = 173)	0.9 ± 1.1	0.1 ± 0.3	0.5 ± 1.1	10.8 ± 9.2**	12.2 ± 9.1**
No (n = 1986)	0.9 ± 1.0	0.1 ± 0.3	0.7 ± 1.2	6.7 ± 6.0**	8.3 ± 6.1**
Hypertension					
Yes (n = 848)	0.9 ± 1.0	0.0 ± 0.2*	0.6 ± 1.1	8.3 ± 6.6**	9.9 ± 6.6**
No (n = 1310)	0.9 ± 1.0	0.1 ± 0.3*	0.7 ± 1.2	6.2 ± 6.2**	7.9 ± 6.3**
Heart disease					
Yes (n = 207)	0.8 ± 1.3	0.1 ± 0.3	0.4 ± 0.9*	10.5 ± 9.6**	11.8 ± 9.6*
No (n = 1945)	0.9 ± 1.0	0.1 ± 0.3	0.7 ± 1.2*	6.7 ± 5.9**	8.3 ± 6.0*

Note. "Regular" patients were defined as those who had made at least two visits in the past 5 years, with one visit occurring within the previous 2 years.
*$P < .01$ (based on t test adjusted for heterogeneity of variance).
**$P < .001$ (based on t test adjusted for heterogeneity of variance).

Medical Record Audits

Medical records provided reason-for-visit data as noted by the medical assistant, nurse, or physician. Visits were categorized as follows: (1) health maintenance, (2) non–health maintenance, (3) administrative physical, or (4) other prevention. General checkups, physical exams, routine physicals, complete physicals, and new patient physicals were coded as health maintenance visits. Non–health maintenance visits included follow-up visits for medical or psychosocial problems or evaluation of symptoms. Administrative physicals included employment physicals, disability physicals, and other exams required primarily for certification rather than for general health care.

Analysis

Data analysis incorporated SAS and BMDP.[4,5] Student t tests assessed differences between the mean number of visits according to the reason for the visit. Univariate analyses of demographic variables and chronic disease prevalence were performed.

We designed stepwise logistic regression models to assess the extent to which chronic disease status predicts having received a specific screening procedure. Each chronic condition (diabetes, hypertension, heart disease) was coded as a binary variable (1 = condition present, 0 = condition absent). Other patient factors shown to influence screening were included in the models as covariates: insurance coverage, education, perceived health status, and total primary care visits over the past 3 years.[6] These covariates were measured as categorical variables except for total number of visits, which was considered a continuous variable. Because of considerable positive skewness in the total number of visits in our sample, a natural-log transformation of this variable was included in our models.

Separate models for men and women were examined for the eight counseling or screening procedures. We used approximately half of the subjects (n = 2154) as a validation sample. Constructed from the estimation sample, the models were evaluated against the validation sample to assess generalizability and evaluate any possible "overfitting."

Results

Subjects

Consistent with the sampling strategy, 68% of patients were female and

TABLE 2—Odds Ratios for Having Received Counseling about Smoking and Regular Checkups in the Past 3 Years, by Sex: Regular Patients of Primary Care Group Practices in the Midwest

	Counseled about Smoking				Counseled about Checkups			
	Men		Women		Men		Women	
Predictor Variable	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Chronic disease								
Diabetes	...	...	0.68	0.44, 1.05	...	...	...	...
Hypertension	...	...	...	...	1.56	1.11, 2.19	1.46	1.12, 1.91
Heart disease	...	...	...	...	...	...	...	...
Insurance coverage[a]	...	...	...	...	...	...	...	...
Full								
Partial								
None								
Education								
Less than high school	1.00	...	1.00	...	...	...	...	...
High school	0.83	0.45, 1.45	0.73	0.47, 1.11	...	...	...	...
College graduate	0.55	0.29, 1.06	0.59	0.36, 0.98	...	...	...	...
Total no. of visits	1.26	0.96, 1.66	...	...	1.40	1.25, 1.57	1.26	1.06, 1.50
Perceived health status[b]	...	...	...	...	...	...	...	...
Poor								
Fair								
Average								
Good								
Very good								
Model fit statistic	4.06		0.624		9.37		12.78	
n	674		1398		673		1404	
df	8		3		8		8	
P	.852		.891		.312		.120	
Validation statistic	6.82		6.18		4.05		9.04	
n	705		1395		704		1403	
df	8		3		8		8	
P	.556		.103		.852		.339	

Note. "Regular" patients were defined as those who had made at least two visits in the past 5 years, with one visit occurring within the previous 2 years. OR = odds ratio; CI = confidence interval. Ellipsis points represent variables not included in the stepwise regression model.
[a]Full coverage was the reference category.
[b]Poor perceived health status was the reference category.

32% were male. Mean age for both sexes was 58 years (SD = 3.3). About 16% of the subjects were retired, and 64% were employed; the median income range was $30 001 to $40 000. The majority were Caucasian (98%) and married (83%). Many were well educated, 48% reporting some college or beyond. Only 13% had no high school diploma, and less than 3% had no health insurance.

Most patients (64%) rated their health as good or very good; only about 2% noted poor health. Fifty-five percent of our sample reported having none of the three chronic disease conditions. Only 8%, 39%, and 10% of patients (n = 2166), respectively, reported having at least one of the following conditions: diabetes, high blood pressure, or heart disease. When we examined the data subdivided by gender (men, n = 696; women, n = 1447), the prevalence of diabetes was 2% for both men and women. In contrast, more men than women reported having only hypertension (31% vs 29%) or heart disease (5% vs 2%). Comorbidity was relatively rare among men, women, and the total sample (rates of 47%, 58%, and 55%, respectively). Only 10% of the total sample indicated two or more chronic disease conditions.

Counseling and Screening Procedures Performed

More than 70% of patients had received counseling about smoking status or regular checkups in the past 3 years. In terms of colorectal cancer screening procedures, nearly 60% of patients reported receiving a fecal occult blood test, and 38% had received a sigmoidoscopy. A greater proportion of women (63%) than men (53%) had received a fecal occult blood test, and a greater proportion of men (40%) than women (37%) had received a sigmoidoscopy.

In terms of female-specific prevention services received over a 3-year period, 90% of the women had received a clinical breast exam, 88% had received a mammogram, 81% had received a Pap test, and 78% had been counseled on how to do breast self-examinations.

Analysis of Visit Types by Chronic Disease Status

Table 1 compares the mean number of health maintenance, administrative physical, other prevention, non–health maintenance, and total clinic visits over the previous 3 years by chronic disease category. As expected, persons with chronic diseases visited the clinic much more than did those without these conditions, and this difference seemed to be accounted for primarily by differences in

TABLE 3—Odds Ratios for Having Received Colorectal Cancer Screening in the Past 3 Years, by Sex: Regular Patients of Primary Care Group Practices in the Midwest

	Sigmoidoscopy				Fecal Occult Blood Test			
	Men		Women		Men		Women	
Predictor Variable	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Chronic disease								
Diabetes	...	...	0.54	0.32, 0.89	0.54	0.27, 1.05	...	...
Hypertension	0.71	0.50, 1.02	0.81	0.62, 1.05	...	...	...	...
Heart disease	0.64	0.40, 1.03	...	...	0.57	0.35, 0.93	0.59	0.35, 0.98
Insurance coverage								
Full	1.00	...	1.00	...	1.00	...	1.00	...
Partial	0.69	0.49, 0.97	0.73	0.56, 0.95	0.61	0.41, 0.89	0.61	0.45, 0.81
None	0.34	0.19, 0.62	0.42	0.28, 0.65	0.44	0.25, 0.76	0.34	0.23, 0.49
Education								
Less than high school	1.00	...	1.00	...	1.00	...	1.00	...
High school	...	...	0.86	0.59, 1.25	...	...	1.09	0.73, 1.63
College graduate	...	...	1.04	0.66, 1.65	...	...	1.57	0.95, 2.60
Total no. of visits	1.18	1.03, 1.35	1.27	1.06, 1.52	1.23	0.95, 1.59	...	...
Perceived health status[a]	...	...	...	...	...	...	...	...
Poor								
Fair								
Average								
Good								
Very good								
Model fit statistic	4.27		6.55		11.73		4.95	
n	552		1087		538		1125	
df	8		8		8		6	
P	.832		.586		.164		.551	
Validation statistic	4.701		8.52		12.4		15.7	
n	554		1062		554		1119	
df	8		8		8		6	
P	.789		.384		.136		.015	

Note. "Regular" patients were defined as those who had made at least two visits in the past 5 years, with one visit occurring within the previous 2 years. OR = odds ratio; CI = confidence interval. Ellipsis points represent variables not included in the stepwise regession model.
[a]Poor perceived health status was the reference category.

non–health maintenance visits. Overall, there were few visits for administrative physicals, and fewer such visits were noted for those with high blood pressure than for those without this condition. We noted a similar trend for other prevention visits for patients with diabetes or heart disease. A significant difference was found in the mean number of other prevention visits for the group with heart disease but not for the other groups.

Logistic Regression

To assess model generalizability, we applied each significant model to the separate validation sample and computed a Hosmer and Lemeshow[7] fit index. In women, the models for fecal occult blood test and Pap test did not cross validate, so we made no interpretations. For the other models, results suggest that our findings should generalize to similar patient groups.

Tables 2, 3, and 4 provide results of the logistic regressions examining whether chronic disease status and other covariates predict receipt of preventive services. An odds ratio (OR) of 1.00 represents the reference group used for comparison. We found chronic disease status to be a significant predictor of not receiving preventive services over a 3-year period for each procedure examined other than counseling about smoking (men) and counseling about breast self-examination (women). Total number of visits was a significant predictor for both sexes of having received checkups or sigmoidoscopies, for women of having received clinical breast exams and mammograms, and for men of having received fecal occult blood tests. Total number of visits was not a significant predictor for either sex of having received smoking assessment or for women of having received a fecal occult blood test, Pap test, or counseling about breast self-examination.

In terms of the chronic disease predictors adjusted by insurance coverage, education, total visits, and perceived health status, the odds ratios were increased for having received a checkup for men (OR = 1.56) and women (OR = 1.56) who reported having hypertension. However, the odds ratios were reduced (range = 0.32 to 0.81) for persons with diabetes or heart disease having received a sigmoidoscopy, fecal occult blood test (men), or Pap test (women); for women with diabetes having received a mammogram or counseling about smoking status; and for women with heart disease having received a fecal occult blood test or clinical breast exam. The only significantly reduced odds ratio for persons with hypertension was that for having received sigmoidoscopy.

TABLE 4—Odds Ratios for Having Received Breast and Cervical Cancer Screening/Counseling in the Past 3 Years: Regular Female Patients of Primary Care Group Practices in the Midwest

	Pap Test		Clinical Breast Examination		Mammography		Breast Self-Examination Counseling	
Predictor Variable	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Chronic disease								
Diabetes	0.64	0.39, 1.07	...	...	0.53	0.29, 0.97	...	...
Hypertension	...	...	...	...	...	...	...	...
Heart disease	0.32	0.19, 0.54	0.54	0.27, 1.07	...	...	...	...
Insurance coverage								
Full	1.00	...	1.00	...	1.00	...	1.00	...
Partial	0.71	0.51, 1.01	...	...	0.63	0.39, 1.00	...	...
None	0.49	0.32, 0.75	...	...	0.30	0.18, 0.49	...	...
Education								
Less than high school	1.00	...	1.00	...	1.00	...	1.00	...
High school	1.24	0.80, 1.93	1.34	0.78, 2.32	1.96	1.22, 3.14	0.91	0.61, 1.36
College graduate	1.75	0.98, 3.16	2.45	1.13, 5.30	3.52	1.58, 7.83	0.71	0.44, 1.15
Total no. of visits	...	...	1.36	1.04, 1.77	1.53	1.18, 1.98	1.28	1.06, 1.54
Perceived health status								
Poor	1.00	...	1.00	...	1.00	...	1.00	...
Fair	...	...	...	...	1.43	0.63, 3.25	7.33	2.18, 24.7
Average	...	...	...	...	3.40	1.63, 7.08	10.5	3.28, 34.4
Good	...	...	...	...	4.31	2.18, 8.54	12.0	3.70, 38.9
Very good	...	...	...	...	8.00	3.58, 17.90	21.3	6.38, 71.4
Model fit statistic	2.47		6.51		5.073		7.19	
n	1277		1281		1319		1414	
df	6		8		8		8	
P	.871		.590		.750		.517	
Validation statistic	22.4		14.7		6.49		28.0	
n	1287		1411		1317		1357	
df	6		8		8		8	
P	.001		0.66		.592		.000	

Note. "Regular" patients were defined as those who had made at least two visits in the past 5 years, with one visit occurring within the previous 2 years. OR = odds ratio; CI = confidence interval. Ellipsis points represent variables not included in the stepwise logistic regression model.

There were also some patterns related to the predictive ability of the covariates by gender. For example, similar reductions in the odds ratios for less than full insurance coverage were noted for colorectal cancer screening in men and women. The more educated women are, the less likely they are to have been assessed about their smoking status and the more likely they are to have received breast or cervical cancer screening. Women who perceive their health as better have an increased odds of having received a mammogram, although perceived health does not predict receipt of any other screening activity.

Discussion

Design and Methods Issues

The findings reported here are based on a sample of persons 52 to 64 years of age who reported a regular source of primary care, indicated high levels of education and family income, and elected to participate in this study. Our predominantly Caucasian sample limits any generalizability of findings to "hard-to-reach" groups. The process of selecting study participants excluded a large fraction of patients in each practice. We cannot describe the characteristics of nonparticipants, since we did not have access to their records.

The current study population can be compared with the population-based 1993 Wisconsin Behavioral Risk Factor Survey of 1567 adults 18 years old and older.[8] The chronic disease prevalence in the sample described here was similar to that for adults 55 years of age and older in the Wisconsin survey. Thirty-nine percent of the Wisconsin participants reported high blood pressure (the same proportion reported in our study), and 10% reported diabetes (as compared with our 8%). The prevalence of heart disease in the Wisconsin survey (10%) and national studies is consistent with our study (8%), although direct comparisons are difficult because of age differences in the samples.[8,9] Despite particular selection biases, our sample is reasonably representative of middle-aged adults residing in the upper Midwest.

The proportions of persons having received cancer screening services were greater than 70% for six (fecal occult blood test and sigmoidoscopy excluded) of the eight screening/counseling procedures examined in this study. The smaller proportions noted for colorectal cancer screening relative to other types of cancer screening parallel the trend noted for national data, but all of our estimates are higher.[1] The most plausible explanation for the high rates of screening reported here is the selection bias that resulted in participants being more health conscious and, thus, likely to be in greater compliance with screening recommendations. Another explanation might be that patients overreport preventive services. However, percentage agreement between seven indicator items (checkup excluded) from the questionnaire and corresponding medi-

cal record notation ranged from 79% to 91% for the five screening procedures, and Cohen's kappa[10] values ranged from 0.47 to 0.68. Agreement was weaker for counseling about breast self-exam (44%, $\kappa = 0.10$) and smoking (74%, $\kappa = 0.24$). This may be a result of primary care staffs' failure to document counseling (vs screening) services and is consistent with data from our previous work.[11]

Data reliability based on patient report deserves comment. Many estimates of health promotion practices are based on physician and patient reports.[12] Recall of ambulatory care use shows high levels of association with reports of test results, overreporting representing a greater source of error than underreporting.[13] Comparisons between patient reports and medical record evidence of mammography show high correlations between these sources of data.[14] Other reports suggest that patients are reliable reporters of chronic conditions, especially when these conditions include heart disease and metabolic disorders.[15,16] In the current study, receipt of Pap tests must be interpreted cautiously since responses represent either a vaginal or cervical Pap test.

Visit data extracted from medical records are subject to potential coding error. These data were extracted and coded by two separate auditors who had to first become familiar with each clinic's specific process of medical record documentation. Interrater agreement was high for screening procedure documentation. Cohen's kappa statistics ranged from 0.75 for discussion of diet to 0.92 for mammography. When a complaint was noted as a reason for a visit, the visit was coded as a non–health maintenance encounter, even though some preventive services might have been discussed. We recognize that this coding scheme may have underestimated health maintenance visits.

Another source of error for estimating occurrence of preventive services involves record notation by providers. Provider notation of services delivered may vary with severity of disease, type of visit, and other factors.[15]

Major Findings

Our study found that nearly 46% of patients reported the presence of at least one major chronic disease. This emphasizes how vital it is that we consider preventive services when patients more than 50 years of age visit for chronic illness management. For men and women alike, the two most frequently reported preventive activities reported involved counseling: asking about smoking status and discussing need for a regular checkup. We found the highest proportions (75% or more reporting) for receipt of female cancer screening procedures and the lowest proportions (37% to 63% reporting) for receipt of colorectal cancer screening, especially for sigmoidoscopy in women.

The number of health maintenance visits by gender was not significantly different for those who did or did not report diabetes, hypertension, or heart disease. Patients with heart disease reported fewer other prevention visits than did those with no heart problems. Perhaps angina or congestive heart failure in the sample impeded receipt of certain preventive services.[17,18] As expected, non–health maintenance and total visits were significantly higher for patients reporting any chronic disease (Table 1). The greater mean numbers of non–health maintenance and total visits clearly point to more visit "opportunities" for delivering preventive services to persons with a chronic disease than to those without such a disease.

An important finding is that the presence of a chronic disease reduced the odds of having received colorectal, breast, and cervical cancer screening and counseling about smoking. This was true for fecal occult blood tests (men with diabetes or heart disease and women with heart disease), for sigmoidoscopy (men with hypertension or heart disease and women with diabetes or hypertension), and for women who received a mammogram (diabetes), clinical breast exam (heart disease), Pap test (diabetes or heart disease), or counseling about smoking (diabetes). This might be explained, at least in part, by the present system of primary care focusing on disease-centered care in an encounter-based system.[19] Perhaps neither physicians nor patients with chronic disease are sufficiently motivated to focus on prevention in a system structured around treating illnesses.

This apparent emphasis on disease-centered care seems to be a plausible explanation if we compare the odds ratios for screening procedures in which greater reductions were noted for those with diabetes or heart disease relative to those with hypertension (Tables 2, 3, and 4). Hypertension is a relatively asymptomatic condition, whereas care for diabetes or heart disease often involves monitoring symptoms that reflect the severity of the disease and/or produce discomfort. Thus, symptom perception and appraisal might be more familiar for patients with diabetes or heart disease, whose interactions with providers may focus on treatment- rather than prevention-centered activities.[20–22] We note that persons with diabetes or heart disease average more non–health maintenance and total visits than do patients with hypertension.

Our study further shows that the presence of hypertension increases men's and women's odds of having a regular checkup recommended to them. However, chronic disease does not appear to influence receipt of counseling about smoking (among men) or breast self-examination education. This is not surprising, since providers often recommend regular checkups as a strategy for monitoring individuals with a chronic disease for associated risk factors (e.g., assessing smoking status in a person with hypertension). Perhaps widespread educational campaigns about smoking cessation and breast self-examination have succeeded, while the lack of similar media efforts for colorectal cancer screening has resulted in fewer persons receiving fecal occult blood tests or sigmoidoscopy. Indeed, more of our sample reported receipt of counseling about smoking (79%) or breast self-examination education (78%), and fewer reported receipt of fecal occult blood tests (38%) or sigmoidoscopy (60%).

We are not sure why we were not able to cross-validate our models for women receiving fecal occult blood tests and Pap tests. This may have been related to type of visit: fecal occult blood tests and Pap tests are often obtained as part of a gynecological exam.

Our work highlights several areas for strengthening the linkages between individual health care and population-based community health. In the face of more frequent contacts with patients having chronic conditions, primary care providers may need a more deliberate approach to incorporating prevention services. Studies have found that patients want more health information than they receive.[23] Therefore, age-appropriate screening guidelines must be emphasized, especially for people with heart disease or diabetes. Policies supporting prevention's integration with other services must be put in place. As the shift to a managed care environment intensifies, provider obligations will need to increase; prevention efforts will need to focus on persons who do not regularly come in for care. Finally, the emerging fiscal structures for primary care delivery will demand more proactive

efforts by patients to obtain—and providers to deliver—prevention services. □

Acknowledgments

This research was funded by the American Cancer Society through grants PBR-51a and PBR-51b.

This research was presented, in part, at the 123rd Annual Meeting of the American Public Health Association, October/November 1995, San Diego, Calif. Portions of the research were completed at the University of Illinois, Rockford.

We are grateful to Dr Roger Brown, School of Nursing; Caroline Clark, program manager, Primary Care Prevention Project; and Robin Bechhofer, BA, Department of Biostatistics, University of Wisconsin–Madison, for their contributions to this study and helpful comments on the manuscript. We also thank Dr Suzanne Fletcher, Department of Ambulatory Care and Prevention, Harvard Medical School, for her review and suggestions on an earlier version of the manuscript.

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